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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/761,993	01/21/2004	Neng-Kuo Chen	JCLA12335	4304
23900	7590	06/19/2006	EXAMINER	
J C PATENTS, INC. 4 VENTURE, SUITE 250 IRVINE, CA 92618			DEO, DUY VU NGUYEN	
			ART UNIT	PAPER NUMBER

1765

DATE MAILED: 06/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/761,993	CHEN ET AL.	
	Examiner	Art Unit	
	DuyVu n. Deo	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 April 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-9, 19, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ji et al. (US 6,787,409) and admitted prior art.

Ji describes a method for forming STI comprising: providing a substrate having a pad oxide 12, a mask 14, and a trench 11 wherein the trench is formed by exposing a portion of the pad oxide and the mask layer (col. 3, line 40-55; col. 4, line 20-23); forming a oxide layer 16 on the trench surface (col. 4, line 38-42); forming an oxide isolation layer by HDP-CVD process to completely fill the trench in two-step process wherein the bias of the second step is higher than the first step (col. 4, line 59-col. 5, line 45); removing the oxide isolation layer over the trench (col. 6, line 1-4.) Unlike claimed invention, Ji doesn't describe the steps of removing the mask and pad oxide layer. However, these steps are known to one skilled in the art during the process of forming STI as shown here by admitted prior art, page 2, paragraph [0005] of the specification. One skilled in the art would find it obvious at the time of the invention in light of the admitted prior art to further removing the mask and pad oxide layers in order to form a STI with a reasonable expectation of success.

Even though Ji is silent about the deposition to etching ratio of the second step is lower than the deposition to etching ratio of the first step, the deposition and etch rates of the first and

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second layer (claims 19-20), and the second layer is denser than the first layer; however, paragraph [0027] describes that all these deposition, etch rates and layer's density are results of a higher bias power. Since Ji describes the same process of using a higher bias in the second step as described above, the first and second layer would have the same or similar deposition, etch rates, and density as that of the claimed invention. The burden is upon the applicant to prove otherwise. *In re Fitzgerald* 205 USPQ 594.

Referring to claims 2 and 4, Ji doesn't describe the first bias power is in the range of 900-2500 W, which would provide a deposition to etching ratio of about 10-20. However, he teaches that the bias varies depending on factors such as thermal oxide layer thickness (col. 5, line 8-10). Therefore, one skilled in the art would find it obvious to determine the bias depending on the thermal oxide layer and through routine experimentation in order to provide optimum bias power and the corresponding deposition to etching ratio to form the isolation with a reasonable expectation of success.

Referring to claims 3, 5, 6, the second bias power is from 1000-3000W (col. 5, line 35-40), which would provide a deposition to etching ratio of about 5-10.

Referring to claims 8 and 9, admitted prior art further describes the mask includes a bottom nitride and a top silicon oxide layers wherein the step of removing the isolation layer over the trench including removing the top oxide layer (page 2, paragraph [0005] of the specification).

Referring to claim 21 (and claim 22) the first layer 18 is non-conformal (col. 5, line 4-7).

3. Claims 10-18, 20, 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ji and admitted prior art, and further in view of Huang et al. (US 6,653,203).

Unlike claimed invention, above applied prior art doesn't describe a step of etching-back to the mask layer to pull back the mask layer. Huang teaches a method for forming STI wherein he teaches of a step of etching to pull back the mask layer (col. 4, line 29-36). It would have been obvious for one skilled in the art to modify above applied prior art in light of Huang's teaching of pull back the mask layer because it would reduce gate oxide thinning when the nitride layer or mask layer is subsequently removed (col. 1, line 45-49).

Response to Arguments

4. Applicant's arguments filed 11/28/05 have been fully considered but they are not persuasive.

Applicant's argument that Ji doesn't describe the deposition and etch rates of the first and second layers is acknowledged. However, it appears, as described in paragraph [0027], that they are results of using different bias power. Since Ji describes the same process of using a higher bias in the second step as described above, the first and second layer would have the same or similar deposition, etch rates, and density as that of the claimed invention. The burden is upon the applicant to prove otherwise. *In re Fitzgerald* 205 USPQ 594.

Applicant's argument that there is no motivation to combine Ji and admitted prior art because Ji describes removing the oxide liner and bulk oxide layer without grooving at the edges of the trench while admitted prior art describe shows a divot around the corner of the trench when removing the mask and oxide layer is found unpersuasive because admitted prior art's embodiment doesn't have the liners layers 16 and 19; however, when the embodiment includes the liners it would solve the problem as shown in paragraph [0007] of the specification. Therefore, there would be no divot or groove formed when removing the mask and pad oxide

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layer. As Ji describes that the mask and pad oxide is used as a stop layer for the planarization step (col. 3, line 65-66), which is the same function as taught by the admitted prior art (page 2 of the specification, paragraph [0005]). The admitted prior art teaches that these layers would then be removed to form a STI.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n. Deo whose telephone number is 571-272-1462. The examiner can normally be reached on 6 am -2:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Primary Examiner

Duy-Vu N Deo

6/14/06

